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NATIONAL CAVE AND KARST RESEARCH INSTITUTE STUDY

REPORT TO CONGRESS

December 1994

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National Park Service
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National Cave and Karst Research Institute Study

A Draft Report to Congress

As Required by

Public Law 101-578 of November 15, 1990

Consideration of the feasibility of establishing
a National Cave and Karst Research Institute
in association with the National Park Service's Cave Research Program

December 1994

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Executive Summary

Aragonite "Christmas Tree" stalagmite, Wind Cave National Park, South Dakota.
Photo courtesy of National Park Service.

Executive Summary

Cave and karst systems are vital to humankind in myriad ways. The protection and management of water resources have been identified as major issues facing the planet as we enter the 21st century – and a full 22 percent of America's freshwater resources are tied up in groundwater in cave and karst regions. Caves also serve as rich storehouses of information about natural resources, human history, evolution, and global climate change – not to mention such current concerns as waste disposal, petroleum recovery, and biomedical investigations.

Congress created a major impetus for America's involvement in cave and karst protection and management in 1988 by passing the landmark Federal Cave Resources Protection Act of 1988 (Public Law 100-691; November 18, 1988), which directs the Secretaries of the Interior and Agriculture to inventory and list significant caves on Federal lands; and also provides for the management and dissemination of information about caves. Federal land management agencies have since developed a heightened awareness of the management needs of the cave and karst resources on their lands; of the need for both a cave research program and a repository for cave and karst information; and of their own growing needs for assistance in inventorying and classifying their cave and karst resources. A Nation-wide assessment of significant Federally-owned caves mandated by the act is currently being conducted, which is adding to the number of known caves on Federal land, and further increasing the impetus for cave management and research.

In Public Law 101-578, of November 15, 1990, Congress further directed that the Secretary of the Interior, acting through the Director of the National Park Service, establish and administer a Cave Research Program; and that the National Park Service prepare a proposal for Congress that examines the feasibility of a centralized National Cave and Karst Research Institute (NCRI), associated with an existing Cave and Karst Research Program already established by the National Park Service, and that this study, prepared in cooperation with other Federal cave-managing agencies, cave-related organizations, cave experts, and interested individuals, develop specific concepts for the nature, scope, role, programs, management, and operational needs of such an Institute.

The study states as goals for the Institute the furtherance of the science of speleology; centralization and standardization of speleological information; interdisciplinary cooperation in cave and karst research programs to foster research; education; promotion of national and international cooperation in environmental considerations for the protection of cave and karst landforms; and promotion of environmentally sound, sustainable resource management practices.

Program areas that the study considers essential to such an Institute's mission include information management; research; and education.

The study envisions that funding for the Institute would come through Congressional appropriations, and from potential contributions from various public or private entities.

The study also envisions that the Institute would be jointly administered by the National Park Service and another entity – probably academic in nature. The National Park Service has been stipulated by Congress as project lead because it manages some 59 park units containing significant cave resources; has had a Cave and Karst Research Program in place; and already has an appropriate general cooperative management model in use, called a "Cooperative Park Studies Unit." The National Park Service would have ultimate responsibility for the Institute, and would retain indirect control over its activities and programs. The academic entity would plan, coordinate, and administer the Institute and its programs.

The location would be a local community (rather than a National Park Service unit) that possesses significant cave resources; provides easy accessibility for researchers, students, and other visitors; is located near the academic entity with which it is associated; and is large enough to offer a favorable quality of life, in order to attract and retain high-quality employees and their families. As specifically directed by Public Law 101-578 (November 15, 1990), the primary location the study focused upon was the region surrounding Carlsbad Caverns National Park. Other areas considered were the Black Hills region (Wind Cave National Park, and Jewel Cave National Monument); the Mammoth Cave National Park region; the Ozark Mountain region within Buffalo National River and/or Ozark National Scenic Riverways; and the Colorado Plateau-Grand Canyon region. Also considered was an academic-entity setting; and a rural, versus an urban, setting.

Subterranean confluence of two rivers, Mammoth Cave National Park, Kentucky. Photo by Art and Peg Palmer.

Introduction

Introduction

A world of vital knowledge, mystery, and surprise awaits discovery in America's caves. Other nations, such as the People's Republic of China, the former Yugoslavia, France, and the former Soviet Union, have already acknowledged the urgent need for the resource management information that caves have to offer, and have for some time actively sponsored and promoted cave and karst research. In the United States, the need for such information is equally great – but, as yet, Federal promotion of research is lacking. This document explores the feasibility of providing a cave research institute in this country.

Cave and karst systems are vital to humankind in myriad ways. For instance, 25 percent of America's freshwater resources are tied up in groundwater in cave and karst regions – and the protection and management of water resources have been identified as the major issues facing the planet as we enter the 21st century. And caves serve as rich storehouses of information about natural resources, human history, evolution, and global climate change – not to mention such current concerns as waste disposal, petroleum recovery, and biomedical investigations.

We Americans are only beginning our journey into the world of cave preservation and management. Until now, a lack of wide support for cave and karst research has hindered our development of speleology into a recognized, mainstream science. Because academic programs to prepare young cave scientists are virtually non-existent, most American cave and karst researchers have entered the field from related disciplines like geology and hydrology, or have begun as cavers. Most research is conducted by dedicated amateurs, with minimal – or no – funding. The few cave- and karst-related organizations and programs that do exist differ substantially in missions, locations, and funding sources. (See appendix C.) Data collected is often presented in a wide variety of non-standardized formats, and sources may be scattered far and wide. Research results are rarely disseminated to others, and are often available only if one knows where to look – for instance, in everything from the *Bulletin of the National Speleological Society*, Federal or state agency files, and articles published in obscure journals, to the personal files of whoever did the work. Nor is there currently any defined or centralized program that analyzes the data that has been collected to determine future research needs.

Congress created a major impetus for America's involvement in cave/karst protection and management in 1988 by passing the landmark Federal Cave Resources Protection Act (FCPRA). This act (appended) mandates that the Secretaries of the Interior and Agriculture inventory and list significant caves on Federal lands, and provides for the management and dissemination of information about caves. Since the passage of this act,

Federal land management agencies have developed a heightened awareness of the management needs of the cave and karst resources on their lands. Many of these agencies are rich in lands containing cave resources. For instance, the National Park Service manages some 58 park units that contain significant cave resources (See appendixes A and B). Federal land management agencies are becoming acutely aware of the need for both a cave research program and a repository for cave and karst information, and also of their own growing needs for assistance in inventorying and classifying their cave and karst resources. A Nation-wide assessment of significant Federally-owned caves mandated by the act will begin in early 1994. This process will add to the number of known caves on Federal land, and increase the impetus for cave management and research.

Groundwork for a National Cave and Karst Research Institute began to be laid in earnest in 1992. The National Park Service listed experts in the fields of cave, karst, and related natural sciences – representing the National Park Service, other Federal agencies, academe, nonprofit organizations, and the private sector. (See appendix H.) A workshop for all study participants (see appendix G) was followed by more research, group discussions, and field visits. More research and group discussions, as well as field visits, followed.

This study reflects the cooperative efforts of Federal agencies that manage caves, cave-related organizations, cave experts, and interested individuals to examine the feasibility of a centralized, National Cave and Karst Research Institute (hereafter referred to as "the Institute"), in association with an existing Cave and Karst Research Program. This program was established by the National Park Service in March 1991, and includes various research and management activities related to cave and karst resources. The objectives of the study are to evaluate whether such a facility is needed; and to develop concepts for its nature, scope, role, programs, management, and operational needs.

This is an ideal time to consider a National Cave and Karst Research Institute. What follows is a description of a collaborative concept for achieving this goal.

Cave and Karst Systems

Description

In the language of the Federal Cave Resources Protection Act, a cave is defined as "any natural occurring void, cavity, recess, or system of interconnected passages which occurs beneath the surface of the earth or within a cliff or ledge and which is large enough to permit an individual to enter, whether or not the entrance is naturally formed or man-made."

Cave types include lava caves, earth-cracks, talus caves, and sea caves. The most common and numerous cave types are solutional caves – that is, caves created when acidic groundwater dissolves limestone, dolomite, marble, and gypsum rocks through the processes of chemical and physical erosion. Such dissolution most often occurs along and adjacent to joints (fractures), faults, and layers in the rock.

Karst can be defined as a landform typified by sinkholes, caves, dry valleys, fluted rocks, enclosed depressions, underground stream-ways, and spring resurgences. Typical landform features include sinkholes, caves, springs, and underground water courses – all of which are formed as rainwater seeps downward through cracks and between layers of limestone, combining with carbon dioxide (from the atmosphere, and from decaying plant matter) to create a weak solution of carbonic acid that dissolves the limestone.

Over 20 percent of the earth's surface is characterized as karst. The United States as a whole is 20 percent karst. East of central Oklahoma, 40 percent of the country is karst. Approximately 58 units of the National Park System contain caves and karst features; these range from as few as 10 to 15 caves per park unit (the C & O Canal) to well over 200 caves per unit (the Grand Canyon). (See appendix B.)

Significance

The National Geographic Society has identified the protection and management of water resources – critical both to public health and to sustainable economic development – as the major issue facing the world as society enters the 21st century. The overwhelming majority of the Nation's freshwater resources are groundwater, some 25 percent of which are located in cave and karst regions.

Too, caves serve as storehouses of information about natural resources, human history, and evolution, offering myriad avenues for pursuing research. Recent studies have

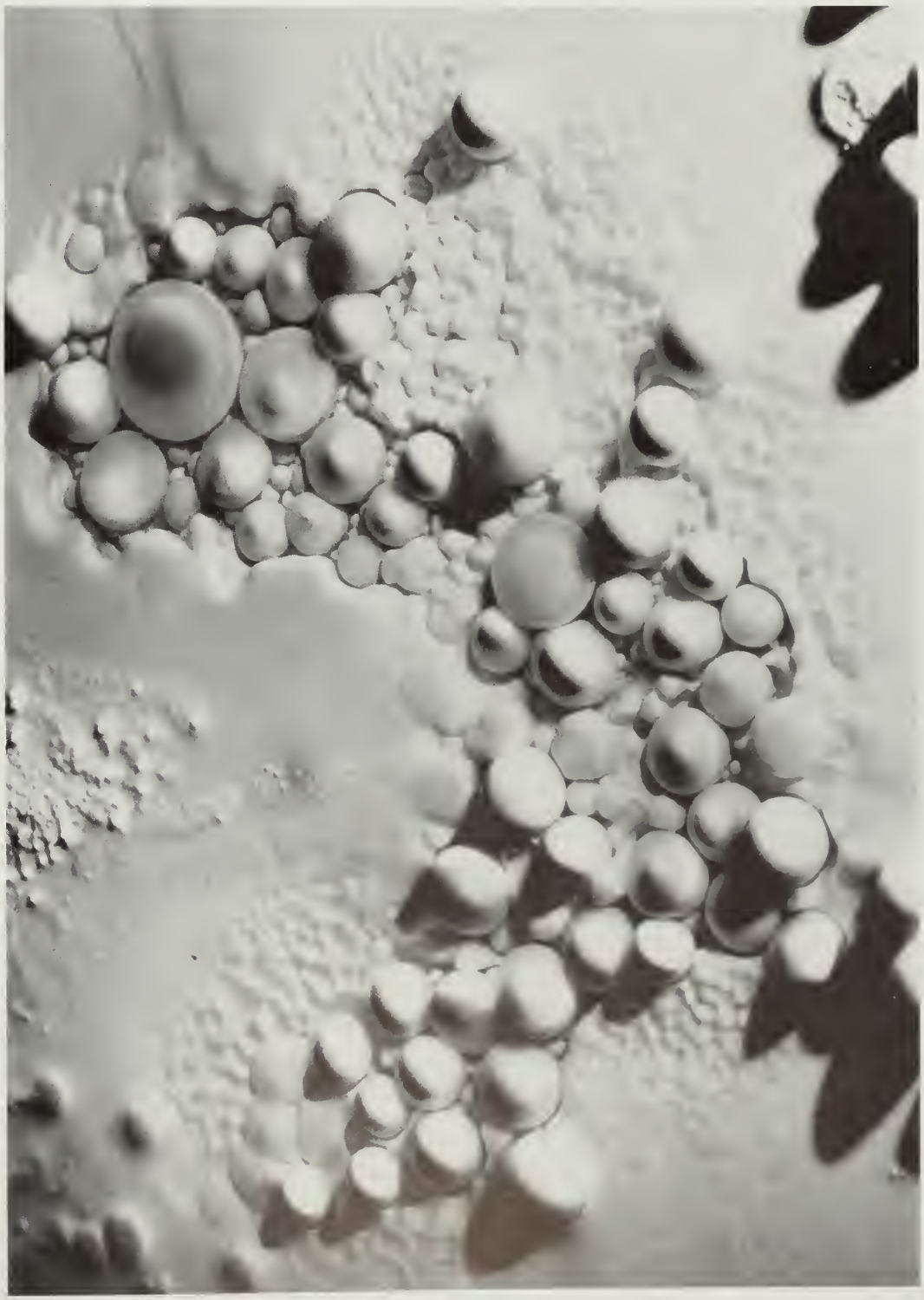
indicated that caves contain valuable data related to global climate change, waste disposal, groundwater supply and contamination, petroleum recovery, and biomedical investigations. Caves also contain information pertinent to anthropological, archeological, geological, paleontological, and mineralogical discoveries and resources.

Perhaps most fascinating among contemporary cave projects is work being done in the area of paleo-climatology. Many researchers have turned to caves as natural laboratories, where paleo-climatic evidence has been naturally deposited over eons, awaiting discovery. For instance, the recently discovered Lechuguilla Cave has excited scientists who expect to gain insight into global-warming theories through the collection and analysis of materials found there. The specialized adaptations of cave-dwelling organisms, such as extreme longevity and enhanced sensory perceptions, can tell us much about evolutionary responses to past environmental changes. Many caves act as natural traps for flora and fauna, and several new species of extinct animals have been discovered during paleontological excavations in caves. Pack-rat middens found in Grand Canyon caves have yielded pollen up to 4,000 years old that contains records of climatic cycles. Samples of travertine from a submerged cave system in Death Valley National Park have yielded a regional paleo-climate record. Cores from carefully selected speleothems in Carlsbad Cavern have also provided paleo-magnetic data and indications of paleo-climatic conditions.

Caves provide a unique view of – and some of the oldest evidence representing – the lifeways and historic events of humankind in the New World. These generally sheltered locations provide conditions that promote the preservation of artifactual materials. For instance, every year, ancient pottery, twig figurines, and other evidence of habitation are discovered in the caves of Arizona's Grand Canyon, and in the lava caves of El Malpais National Monument in New Mexico. In Slaughter Canyon Cave in Carlsbad Caverns National Park, New Mexico, recent studies have led to the discovery of one of only a few deep cave art sites known in the United States. Anthropological studies at Mammoth Cave National Park in Kentucky indicate that prehistoric people used cave entrances for thousands of years for shelter; mined cave minerals useful as medicine (leaving behind well-preserved cane/reed torches, woven sandals, and baskets); ate fruits and nuts still found in central Kentucky today (leaving behind seeds, gourds, squashes, parts of domesticated sunflower, marsh-elder, and other plant parts, and pollen from paleo-feces and cave sediments); and often penetrated as far in as 3 miles from the nearest entrance to explore caves.

Cultural remains in caves are extraordinarily varied, ranging from ancient prehistoric torch smudges on cave ceilings to historic War of 1812 saltpeter vats used to make gunpowder. In spite of the diversity of cultural materials, all caves containing them have two attributes in common: 1) they are subtle, elusive, or fragile – or all three; and 2) they provide unique and valuable information about the past. Without proper documentation and research, significant and valuable segments of our common human history will be lost for all time.

Not only are caves important in understanding our cultural past, but in many areas they are still considered sacred and as having religious significance by present-day American Indians and other Native Americans. Thus, any research efforts that might disturb cave areas should be preceded by appropriate consultation with traditionally associated cultural groups. Of course, such consultations depend on the prior identification of culturally affiliated groups and preparation of consultation plans.



Cave pearls in Lechuguilla Cave, Carlsbad Caverns National Park, New Mexico. Photo by N. R. Thompson, Courtesy of the National Park Service.

Threats

Without proper management, the use of caves by humans can cause serious negative impacts upon cave resources, including alterations in the surface water flow patterns in karst regions; alterations in or pollution of water infiltration routes; changes in cave airflow patterns; drastic modifications to cave micro-climates; the introduction of foreign and harmful elements into caves; and the disturbance of cave biota. We know that biological resources already in jeopardy include several species of endangered bats, ferns, and lichens. Especially vulnerable are cave-adapted invertebrates. So little is known about many of these species that the evaluation of population stability, impacts from current and past human activities, and probabilities for species survival cannot be assessed without further inventory and monitoring efforts.

Because cave and karst systems are intimately tied to local and regional hydrological systems, threats to these natural systems that are allowed to go unchecked can have impacts on water supplies and water quality. Direct threats to cave and karst groundwater aquifers can include inappropriately placed toxic waste repositories, poorly managed or designed sewage systems, landfills, oil and gas leaks from hydrocarbon development, agricultural waste, food processing waste, and toxic and corrosive chemical spills – all of them possibly costing millions of dollars to remedy, and all exerting devastating impacts on karst aquifers. In addition, erosion resulting from agricultural activities, such as excessive tillage and overgrazing, as well as deforestation and fires, can result in significant deterioration of water quality from sediment loading.

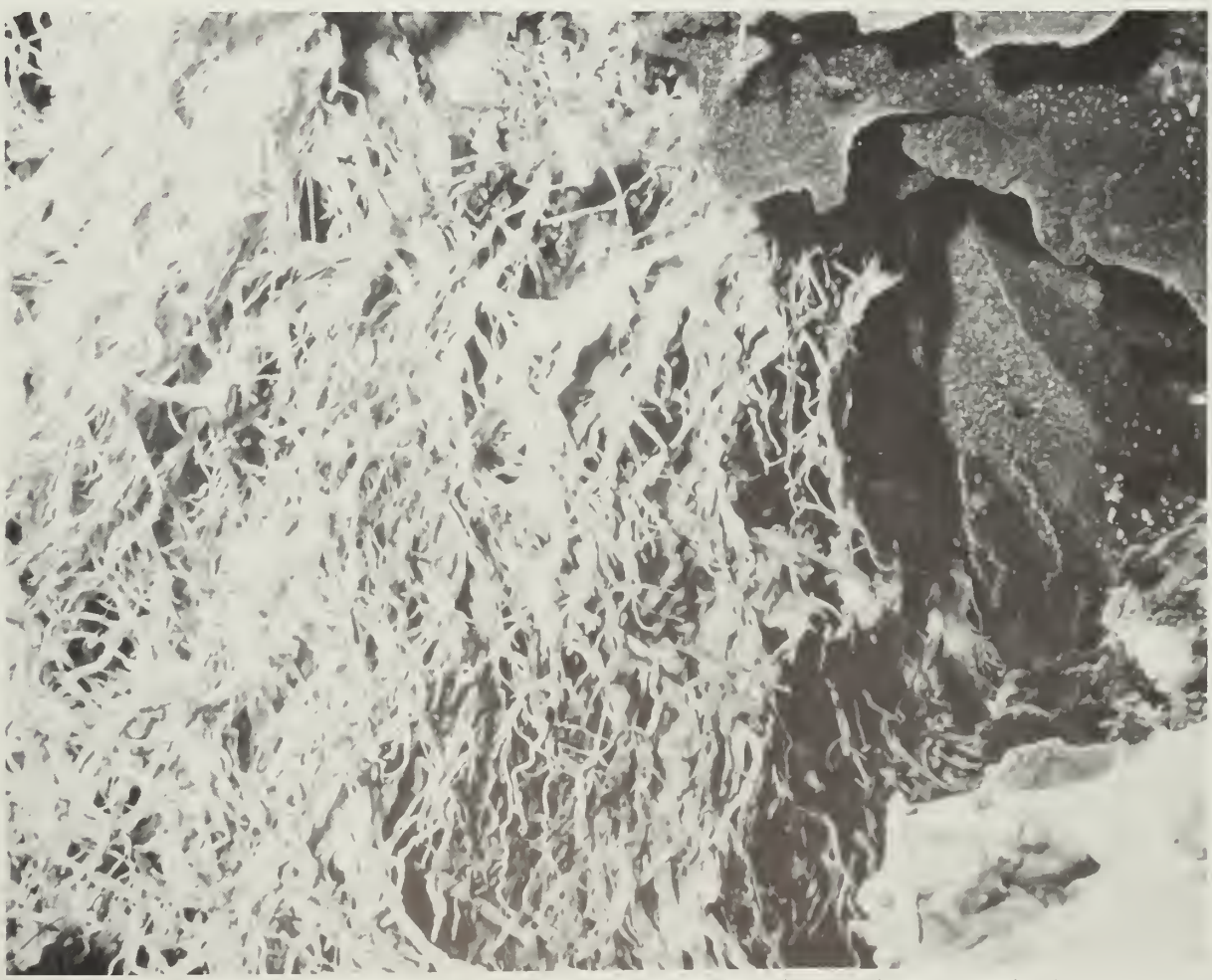
Threats and dramatic impacts to delicate and fragile cave ecosystems and entrances can result from inappropriate, insensitive, or non-managed recreational use – such as over-use and mineral collection. Changes in cave ecosystems also result from such factors as poor cave-gating techniques, which can cause physical barriers or microclimatic changes detrimental to endangered bats and their habitats.

In the past, uninformed management practices have taken a toll. It was difficult for managers to think of caves as anything but potential hazards to public well-being. The assessment of caves was perceived as difficult, and their importance and relevance to surface ecosystems were misunderstood. Thus, caves were rarely thought of as assets, except when they could be developed for public entry. Only developed caves were managed with any degree of concern, and most management was directed toward public safety and allowing visitors the closest possible proximity to major scenic features. Because of concerns for ready visitor accessibility, many developed caves (both public and private) have suffered from a management style that was inadequate for long-term cave resource protection. An example is the extensive development of facilities for visitor comfort and safety, National Park Service administration offices, and the placement of employee residences over such internationally significant caves as Mammoth and Carlsbad Cavern. Such placement poses direct environmental threats to cave resources and

speleologic processes. Attendant gas and sewer lines that may overlie cave passages are of great concern. And, over time, buried lines and fuel tanks located over caves can lead to negative impacts. Leaks can go undetected for months – even years. Fortunately, legislation has been introduced to deal with underground fuel tanks, and parks have been taking a critical look at lines running in close proximity to caves.

It is now known that one of the most detrimental threats to visited caves is the deposition of foreign organic materials, including clothing lint. As people travel through a cave (and in some developed caves there can be as many as 1 million of them per year), lint is released from clothing and collects on cave formations and walls. The lint acts as a substrate, and provides nutrients for the growth of algae. As the algae grows, root systems are established in the cave formations, thereby degrading them. Another extremely detrimental process in visited caves is the handling of the cave formations by visitors, which causes soiling; breakage; and changes in the depositional rates of the cave formations caused by the accumulation of oils and dirt from human hands.

It is only through the expansion of our understanding of and sensitivity to cave resources that we can prevent impacts like these to America's precious natural resources and cave ecosystems.



Rare helectite bush, Wind Cave National Park, South Dakota.
Photo Courtesy of the National Park Service.

Goals / Objectives

Fluted dome pit, Keller Well, Mammoth Cave National Park, Kentucky.
Photo by Art and Peg Palmer.

Goals / Objectives

Goals for the proposed National Cave and Karst Research Institute are:

1. Furtherance of the science of speleology.

2. Centralization and standardization of speleological information.

3. Interdisciplinary cooperation in cave and karst research programs to foster research.

4. Education.

5. Promotion of national and international cooperation in environmental considerations for the protection of cave and karst landforms.

6. Promotion of environmentally sound, sustainable resource management practices.

Objectives for the proposed National Cave and Karst Research Institute are:

1. Establish a comprehensive cave and karst library, a research bibliography, and a cave management information data base.

2. Develop a centralized speleological data storage and retrieval system.

3. Sponsor national and international cave and karst symposiums.

4. Develop long-term speleological research studies.

5. Promote research through a staff of research scientists and visiting scientists.

6. Produce a family of cave-related educational publications, including audiovisual materials and video tapes.

7. Develop cooperative agreements with all Federal agencies having cave management responsibilities.

8. Establish and maintain contacts with other agencies, universities, energy companies, and private-sector groups engaged in activities that have a relevance to cave and karst areas.

9. Sponsor speleological and cave and karst management seminars.

10. Use data to improve resource management practices for cave resources within National Park Service units and on other Federal and public lands.

Popcorn stalactites, stalagmites, Carlsbad Caverns National Park, New Mexico. Photo by Fred Mang, Jr., Courtesy of the National Park Service.

Programs

Programs

Introduction

Three program areas are proposed for the National Cave and Karst Research Institute, each of which would be essential to the Institute's mission: 1) information management; 2) research; and 3) education.

Three primary goals are proposed for each of these program areas: 1) to foster sustainable resource management for both public and private lands; 2) to further the science of speleology; and 3) to raise people's level of understanding about cave and karst systems.

Information Management

Library

The National Cave and Karst Research Institute would administer a comprehensive information management program. Information would be collected on various aspects of such topics relating to caves and their management as speleology, geology, and hydrology. The library collections would contain standard general reference and discipline-specific reference works; published and unpublished monographs; discipline-specific hard-copy and microfiche serials; non-book materials (maps, photogrammetric images, etc.); separates (journal articles, conference papers, etc.); full text documents on CD-ROM and/or hard disk; and aids for finding cave/karst databases and research collections external to the Institute. The primary focus of information collection would be from units of the National Park System, but other agency information would be accumulated and archived as it became available.

In general, the Institute would provide services for staff, cave and natural resources managers, universities, visiting researchers, students, and other groups performing cave and karst research. Services would include collection of selected materials; provision of access to automated information resources; compilation of customized bibliographies; and provision of reference and inter-library loan services.

The medium of information storage would be on read/write optical disks. The technical requirements would be relatively simple. Optical disk devices are now

available that hold considerable information, and that are inexpensive. Data could be distributed by optical disk to those who have readers; by Internet to those who do not have optical disk technology; and by high-speed modem to other users.

Collections / Curation

A small museum collection (that is, kept to an absolute minimum) would need to be maintained to help support the research program, education, and exhibit missions. Collections from caves in the region of the Institute would be developed to support the Institute mission. Type-collections of geological and biological specimens would be developed for use by visiting researchers.

The policy proposed would be to have collections curated at local colleges and universities, with appropriate National Park Service acquisition numbers assigned, and regular oversight maintained. The Institute could occasionally obtain specimens for specific research projects on a temporary-loan basis; once the projects were completed, the specimens would be immediately returned. This policy would avoid the duplication of effort, and would protect finite resources from over-collection. This policy would also relieve the Institute of storage problems, and reduce the number of curatorial staff required.

For scientific projects generated through the Institute, a system for tracking collections would be needed. Whether or not specimens were collected as part of a given project, every project would be assigned an accession number. Thus, if documents were all that was produced from a project, they would themselves become the collection.

The collections would need to be managed according to National Park Service standards for the preservation, protection, and documentation of collections.

A number of curatorial issues remain to be resolved in future planning, including ownership of specimens and artifacts to be curated at the Institute; disposition of collections resulting from paleontological, archeological, or historical research in caves; curatorial standards for collections curated at local colleges and universities; and the need for interagency repository services.

Research

As has been mentioned, the primary mission of the National Cave and Karst Research Institute research program would be to administer research grants, rather than emphasize

active research. The National Cave and Karst Research Institute would provide cave resources and research information nation wide, by acting as a focal point and clearinghouse for programs administered by Federal agencies, universities, and other cave research organizations. These functions could be accomplished through formal agreements, and through the utilization of advanced technology to disseminate information to agencies and organizations involved in cave resources management, education, and research.

The National Park Service and other Federal agencies would consolidate research and monitor funding through the Institute. The Institute could also facilitate grant applications to other entities by providing access to the library, special equipment at the Institute, or consultation on grant applications.

Staff scientists would not conduct extensive research, but would rather concentrate on the application of research findings, and the administration of the grant program. Staff scientists could also be available for consultation about special projects, or about details for short periods of time for consultation on project design or implementation. They could also be involved in activities such as presenting lectures and conducting symposiums.

A visiting-scientist program would be desirable. If possible, a modest stipend could be offered to visiting researchers (those on sabbatical, for example) who are working in National Park Service or other Federal agency caves. This would depend on either appropriated funds from Congress, or on grant application to other funding entities.

Fewer and fewer students are entering the field of speleology. A summer program for students could be extremely valuable in recruiting karst researchers for the future. This option would require either appropriated funds or grant funding from other entities.

Caves are often of religious significance to present-day American Indians and other Native Americans, and any research efforts that might disturb cave areas should be preceded by appropriate consultation with traditionally associated cultural groups, including Native Americans. Of course, such consultations depend on prior identification of culturally affiliated groups and preparation of consultation plans.

Education

The National Cave and Karst Research Institute would promote an active education program, to provide information that would further the understanding of cave and karst processes. This education program would have two focuses: the professional community; and the general public.

Professional-community Focus

The portion of the education program directed to the professional community (government, academic, and private scientists; natural resource and cave managers; and cave and karst interpreters) would be very important to the mission of the Institute. Its primary goal would be to advance the science of speleology for the professional community, to be accomplished by providing the latest information pertaining to all aspects of the subject, and by encouraging interaction among members of its constituency.

It is vital to the science of speleology that its professional community be provided with a vehicle for the exchange of ideas. An important element of the Institute's education program would be to support this interchange by promoting and conducting workshops, conferences, and symposiums at which attendees could present papers, findings, and summaries of work in progress. As part of the Institute's role as clearinghouse, the education program could also provide information about related happenings occurring elsewhere.

The Institute could also support peer interchange by issuing the latest speleological information by means of written media. Such information could be presented in the form of investigation summaries, research findings, scholarly papers, and newsletters. The material contained within these formats could originate from both Institute staff and the professional community. For example, a report of the activities of the Institute could be issued twice a year – perhaps in the form of a newsletter, in a simple format such as WordPerfect, placed on a bulletin board available to modem-users. This publication could also carry information about new data acquired, grant application information, and a host of other related materials.

As mentioned under Research, the Institute would promote a summer student program. The Institute would plan and operate cave-management training for Federal employees and others who manage caves.

Public Focus

The portion of the education program directed toward the public would be very important to the mission of the Institute. It would have two goals:

First, because cave and karst phenomena are not well understood or appreciated by the public, the program would be designed to raise the consciousness of the public about the many benefits that such systems provide. It would educate people about the negative impacts imposed upon caves and karst, and what can be done to remedy such problems.

Second, because the expenditure of public money requires support, and visibility would be important to ensure long-term congressional support, the public focus of the Institute's education program would be designed to generate good will and support for the work done by the Institute. Public programs could be delivered at the Institute, and at other locations. A portion of the Institute facility would be dedicated to public information, and would include a contact desk, a sales area, and exhibit space. Sales items might include a full spectrum of cave-related books and publications; and also possibly videos, maps and posters, and a generic curriculum guide. Exhibits would include both flat-panel and case.

It is anticipated that the Institute would periodically host visiting school groups.

The outreach element of the program could be delivered both in house and out of house. For example, Institute staff could present invited lectures and conduct symposiums on specific topics. The primary thrust of the outreach program would be realized in concert with others. The Institute would support and work cooperatively with existing education and outreach programs that are directed to the public. Environmental education programs might be found in schools, universities, private environmental education programs, national park interpretive programs, and other land-management-agency interpretive programs. The goal of interaction would be to ensure that the latest information pertaining to cave and karst issues was included in education and interpretation activities.

The Institute could develop environmental education materials to be delivered by others, including curriculum guides, audiovisual programs, and traveling exhibits. It is anticipated that the Institute would not develop these materials directly, but rather would have them done by contractors.

Management

Calcite rafts, Lechuguilla Cave, Carlsbad Caverns National Park, New Mexico.
Photo by Ann and Peter Bosted, Courtesy of the National Park Service.

Management

The National Cave and Karst Research Institute should be jointly administered by the National Park Service and another entity – probably an academic entity. This general management model is already in use within the National Park Service, and is called a "Cooperative Park Studies Unit" (CPSU). The National Park Service would serve as the primary lead, with ultimate responsibility for the Institute, and would retain indirect control over its activities and programs. The academic entity would actually plan, coordinate, and administer the Institute and its programs. The Institute could be located either at the site of the academic entity or at a separate location.

It is logical for the National Park Service to serve as the lead agency for the Institute because of its long history of cave management, dating back to the establishment of Mammoth Cave (fully operational in 1941); its strong mandate for managing and protecting cave systems; and its large number of park units containing significant cave resources. The Institute would have to compete for personnel and funding with other units of the National Park System.

The affiliation of the Institute with a major educational institution and other Federal land management agencies (such as the U.S. Forest Service and the Bureau of Land Management) would provide many benefits: Such an association with other Federal agencies and an educational institution would increase the perception of credibility for the Institute. Funding opportunities would be enhanced by such an arrangement. A dual administrative arrangement should receive broader political support. And co-management by a non-Federal entity, such as an academic entity, would increase the funding sources allowed, such as grants, donations, and contracts. Depending upon how the affiliation agreement was structured, academic entity resources such as facilities, equipment, supplies, staff, and professional advice, could be made available for use by the Institute.

The association between the National Park Service and an academic entity could also provide opportunities to enhance the mission of each entity, including the conducting of basic research, the dissemination of scientific information to interested users, and the education of the public and of professional scholars.

Setting up such an arrangement would be fairly simple: First, the project would require funding. Next would come the search for an appropriate entity to cooperate with the National Park Service in Institute management and operations.

The search would be initiated by the preparation of "A Request for Proposals" (RFP) describing the Institute, a recommended location, its mission, and its needs, and then be

advertised nationally. Responses to the RFP would identify public and private entities interested in assuming the role of cooperator. From this process, a suitable cooperator would be chosen. This process would meet the Federal Acquisition Regulations for fair and open competition for Government acquisition. It would give the private sector the mechanism with which to compete for the opportunity to cooperate in the management of the National Cave and Karst Research Institute.

As noted above, the management entity would not necessarily need to be located with the Institute. (For example, Los Alamos National Laboratory in New Mexico is administratively operated by the University of California.)

Next, the legal instruments would be prepared: A cooperative agreement would probably be used, assuming a university or other academic entity were chosen. It could be anticipated that the Institute might also be involved with other entities and Federal agencies. In general, a cooperative agreement would be used to transfer money from a Federal agency to a non-Federal agency; an interagency agreement would be used to move money from one Federal agency to another. Opportunities could be provided for extended details for state, Federal, or academic entity personnel. This would be arranged under the Interagency Personnel Transfer Act.

Other management possibilities for the National Cave and Karst Research Institute were evaluated. For example, the concept of joint management between the National Park Service and one or more other agencies was rejected because of the probable inefficiency of such an arrangement. Agencies have differing missions and organizational structures. It was perceived that this arrangement could require additional coordination, meetings, and paperwork. The concept of oversight by another agency was also discarded, because it was perceived that other land management agencies have weaker mandates for cave protection, and might not receive as much management support as the National Park Service would. The concept of lead oversight by a private foundation or an academic entity was also dismissed. Although either type of managing entity could lend credibility and leadership to the Institute, each would also control programs. Federal cave areas, for whom the Federal Cave Resources Protection Act was written, may or may not receive sufficient attention.

OPERATIONS

Operations

Introduction

In all facets of the development of the concept for operation of the National Cave and Karst Research Institute, care has been taken to avoid duplicating facilities and services that may exist in the local community or in the academic entity with which it is associated. For example, large conferences and symposiums would be an important part of the education program. However, rather than construct an auditorium, the Institute would take advantage of local conference facilities, classrooms, and other suitable spaces. Vehicles could be leased rather than purchased. These measures could help keep costs down for the Institute, and could help boost the local economy.

The discussion presented below considers the needs of a fully operational Institute (during its fifth or sixth year) in terms of facility, staffing, equipment, visitor housing, costs, and funding. Please note that costs and funding are broken down into phases as follows: Years 1-4, initial establishment, design, construction, and equipping of the Institute; and Year 5, fully operational.

Facility

The leasing of a building would need to be considered in the initial stage of the Institute. Leasing would have the advantage of requiring less funding than new construction. Such a building would need to meet size, layout, and mechanical requirements, and should not require extensive and costly rehabilitation. However, it may be difficult to locate an appropriate building in some of the rural locations that are being considered.

Ultimately, the National Cave and Karst Research Institute would be housed in a new facility constructed for that purpose. The advantage of new construction would be that the facility could be designed to meet the exact needs of the Institute, and could help ensure smoother long-term operations. The short-term disadvantage would be the higher costs due to design services, construction, and land purchase.

To help determine building space requirements, the maximum number of people who might use the facility (that is, the carrying capacity) at any one time can be estimated at approximately 40. This number includes full-time employees and visiting researchers, plus an additional number who might be present for meetings.

The optimum size of the National Cave and Karst Research Institute facility is estimated to be about 9,740 square feet. This size is based upon the formula used by the General Services Administration (GSA) for Government buildings, and incorporates the carrying capacity discussed above. It assumes that the community in which the Institute would be located could provide some services. It includes both office-type space and special-use spaces (for example, laboratory, darkroom). The lot size needed would be between 5 and 10 acres. The list below briefly describes facility components – that is, the types of spaces needed:

- General office space: 3,500 square feet. Would include offices for regular staff and visiting researchers, file space, reception area, break room, office-supplies storage.

- Visitor contact area: 600 square feet. Would include a reception area, a sales area, and exhibit space.

- Restrooms: Two, each 200 square feet.

- Equipment storage: 200 square feet.

- Meeting/conference room: 600 square feet. Flexible design to accommodate various types of meetings. (Large meetings such as symposiums and conferences could be held at local conference facilities.)

- Laboratory space: 1,000 square feet. Sized to be a fully functional lab as the Institute evolves, but would begin on a smaller scale. Could also function as a teaching lab.

- Library: 2,200 square feet. In addition to a shelving area for collections, would contain map storage, a processing area, a computer work station, and a librarian's office. The library would adjoin the Geographic Information Service (GIS) facility space, and would be tied in to a common security system. It should have fire-suppression and water-detection systems that could also be linked to the curation lab/museum storage areas.

- Computer space: 600 square feet. Located adjacent to library. Would primarily be devoted to GIS equipment and other equipment deemed necessary.

- Curation lab/museum storage: 600 square feet. Special requirements: located out of floodplain; collections storage space should be separate from the research area; should have fire detection and suppression system, intrusion alarm, and insulation; no windows; the storage space would have only one door; no water pipes in the walls or ceiling; and no utility panels located within storage area.

- Darkroom: 240 square feet. Needed for enlarging and developing various microscope films.

- All lab and darkroom facilities would be constructed and maintained in compliance with all hazardous waste disposal and employee safety and health guidelines.

Calcite boxwork, Wind Cave National Park, South Dakota.
Photo by Jack Boucher, Courtesy of the National Park Service

Staffing

The National Cave and Karst Research Institute would need credibility if it were to effectively function as proposed. Although the primary mission of the Institute's research program would be to administer grants rather than to actively conduct research, the Institute should be primarily staffed by active and experienced scientists rather than by people who are more administratively oriented. Active scientists would understand the research process, and could better evaluate proposals, grants, and programs. A primarily scientific staff would also be available to participate in decisions pertaining to overall operations and management of the Institute. Salaries of all personnel should be competitive with academe.

It is anticipated that the fully functioning Institute would have 17 fulltime employees:

- Director, GM-14: Primary role, to promote the National Cave Research Institute; to make contacts with such entities as politicians and Federal agencies; to handle public relations; and to gain funding. Secondary role, to provide program oversight.

- Program Director/Chief Scientist, GM-13: Oversight and management of all operations and programs of the Institute.

- Staff Scientists, GS-12/13: Four (4). Oversight of the research program(s). Includes a combination geologist/paleontologist; anthropologist; biologist; and hydrologist.

- Cave/Resource Management Specialist, GS-11/12: A generalist. Liaison with cave resource areas pertaining to cave management, trouble-shooting.

- Librarian/Information Management Specialist, GS-11/12: Science background and experience with on-line database searching, special libraries, cataloging, and interlibrary loan and cataloging modules.

- Systems Manager, GS-11/12: Management and maintenance of all data-management systems. This position could be shared with the cooperating academic entity.

- GIS Specialist, GS-11/12.

- Education Coordinator, GS-9/11: Coordination and management of education program.
- Technician, GS-7/9: Management of data; files, primarily within the library.
- Receptionist, GS-7: Greeting visitors, answering questions, managing sales area.
- Administrative Officer, GS-9/11.
- Contracting Officer, GS-9/11.
- Budget Clerk, GS-5/6: Budgeting.
- Secretary, GS-5: General secretarial duties.

The need for a staff curator and/or cultural resource specialist should be evaluated in future planning.

Equipment

The National Cave and Karst Research Institute should provide needed equipment that would be unavailable locally, and/or that would be essential to day-to-day operations:

- Vehicles (to be leased from GSA).
- Laboratory equipment, such as microscopes.
- Darkroom equipment.
- Computer hardware and software.
- Library collections.
- Library equipment, such as a copying machine, shelving and files, a freezer for negatives, study tables, microfilm reader/printer, network terminals.
- Global Positioning Units.
- Caving equipment.

Visitor Housing

Housing would be needed for visiting researchers. The cost of both managing and maintaining dormitory space is felt to be prohibitive, and could deflect attention from the main focus of the Institute. Therefore, it is proposed that the National Cave and Karst Research Institute would contract with local commercial operations such as motels to provide this service. At a later date, the feasibility of providing housing could be re-considered.

A housing allowance, to be made a part of grant funding, might be among possible methods considered for reimbursing researchers.

Visiting researchers working in parks should be housed by those parks whenever possible.

Costs

The following costs and funding for the National Cave and Karst Research Institute are broken down into phases as follows: Years 1-4, initial establishment, design, construction, and equipping of the Institute; and Year 5, fully operational.

Please note that the cost estimate provided below is considered a "Class C" estimate – that is, rough.

Phase 1: Years 1-5

Approximately $300,000 would be needed to fund the first phase of the Institute. It is anticipated that until the Institute becomes fully operational, its needs would be minimal: small staff; lease of a small structure; and minimal equipment and supplies.

The total anticipated costs of designing and constructing a permanent National Cave and Karst Research Institute facility would be approximately $5 million. This amount includes such needs as land purchase; construction planning and design; site development; new construction, construction contingency, and construction project supervision; and equipment and furnishings for the Institute.

Phase 2: Year 5 or 6

It is anticipated that the Institute would be fully operational during its fifth or sixth year. The total annual operating budget would be approximately $1.5 million. This amount includes such items as salaries; staff travel and training; research grants; equipment maintenance; and office operations and supplies.

Funding

Funding for the National Cave and Karst Research Institute would come from Congressional appropriations, and from potential contributions from public or private entities.

Location

Areas of Consideration

The primary location evaluated for the National Cave and Karst Research Institute was the region surrounding Carlsbad Caverns National Park. This focus resulted from Public Law 101-578, November 15, 1990, which directed that the "analysis of potential sites for the Institute should include, but not be limited to, Carlsbad Caverns National Park."

Other areas were also considered because of their significant cave resources: the Black Hills region (Wind Cave National Park and Jewel Cave National Monument); the Mammoth Cave National Park region; the Ozark Mountain region within Buffalo National River and/or Ozark National Scenic Riverways; and the Colorado Plateau-Grand Canyon region.

Consideration was also given to an academic-entity setting, and to a rural setting versus an urban setting.

Colorado River from Rampart Cave, Grand Canyon National Park, Arizona, 1940. Photo courtesy of the National Park Service.

Workshop Findings

At the conclusion of the workshop, consensus was reached on several decisions pertaining to location:

First, it was decided that the proposed National Cave and Karst Research Institute should not be located within the boundaries of a park, for the following reasons: the Institute might place further strain on park budgets and personnel; it could be difficult to find environmentally suitable sites that would also be located separately from visitor use areas; and location within a park might also give the impression that the purpose of the Institute was to serve only that park rather than nationwide cave resources management needs.

Second, the group decided that the Institute should be located in an area that possesses cave and karst resources – especially one with identified cave research needs. Although this decision might appear obvious, it must be kept in mind that the primary role for the Institute would be administrative. Such a function would not necessarily require a resource-based location as much as it would require a

centrally located, easily accessible, one. However, one advantage of a resource-based location would be the "show-and-tell" aspect. Visitors, such as potential funding entities, could experience the actual resource, along with learning about the Institute. The general public might be more likely to visit the Institute, because they might be visiting local cave areas. School-children who would be aware of local caves might more easily relate to information provided at the Institute. Another advantage would be that such a location would likely attract the type of staff desired – that is, active scientists interested and involved in caves. Finally, such a location near cave resources would facilitate a summer student research program.

The group decided to support the Carlsbad area as a viable site for the Institute, primarily for the following reasons:

- Although some other areas under consideration could be viable sites for the Institute, the Carlsbad location was seen to have broad support from private and political (local, state, and regional) sources. Assuming that the management framework for the Institute was set up appropriately, other cave resource areas would also benefit.

- The local cave resources are extremely varied, and unique. Relatively short drives lead to gypsum karst, alpine karst, and lava pseudo-karst, as well as to the unique limestone caves of the Guadalupe Mountains' own unique karst. Additionally, Lechuguilla Cave and Carlsbad Caverns are nationally renowned.

- The new Carlsbad Environmental Monitoring and Research Center could serve as an associated resource, and could minimize the academic isolation of the Carlsbad area.

- The local oil and gas industry would be supportive of such a venture, and could be potential sponsors.

- There are three Federal land management agencies located in the area, all of which would support a research institute, because each has major cave management responsibilities.

Post-workshop Findings

Although the workshop group decided to support the Carlsbad location, it was agreed that further analysis should be undertaken. Such research was undertaken to ensure that Carlsbad would be a suitable location, and that all five areas were objectively considered.

Site selection criteria had received only preliminary development at the workshop; this was refined afterwards, once the Institute framework had become more firmly established. The refined criteria were based upon the needs of the Institute.

The five areas under consideration were then compared to the criteria that had been established. Due to funding constraints, the method of comparison was by means of questionnaires and phone interviews rather than by personal field visits. The questionnaire was designed to compare the different areas with each other, and to illuminate the pros and cons of each.

Because the Carlsbad area had been sanctioned at the workshop, and had been suggested by the legislation directing the National Cave and Karst Research Institute study, a field visit was made to look more closely at the area. The primary purpose of this visit was to determine the range of building sites and properties for lease that might be available to house the Institute. (See appendix E.)

Criteria

The following criteria were developed to evaluate and compare the potential locations for the Institute. They are generally listed in the order of perceived importance, and also take into account the fact that the communities are rural.

First, the Institute should be located in an area that possesses significant cave resources. Preferably, the community selected should be within a 30- to 60-minute drive from the area's caves.

Second, the Institute should be easily accessible to visitors by means of major airports and highways. Ideally, there would be a major airport within a 90-minute drive. Although this is not essential, such relatively easy accessibility would facilitate many of the programs proposed for the Institute, such as the visiting researcher program, summer student program, and education program.

Third, the ideal arrangement would be to locate the Institute near the academic entity with which it is associated. Although this is not essential, it would allow the Institute to take advantage of the resources that exist at the academic institution; encourage interaction with peers; and provide for the use of libraries, lecture halls, laboratories, equipment, and other academic resources. Ideally, the Institute would also be near other academic institutions, libraries, and research institutes.

Fourth, to attract and retain high-quality employees and their families, the community housing the Institute should provide a favorable quality of life. Some characteristics to consider in this regard include:

- Available and affordable housing for staff.
- Reasonable cost of living.
- Good school system.
- Quality health care.
- Reasonably good job market for families of staff.
- Cultural opportunities within a reasonable driving distance.
- Recreational opportunities within a reasonable driving distance.
- Commercial space that could be leased.

Area Comparisons

As discussed above, the Institute should be placed in a local community rather than in a National Park Service unit. For the most part, communities were chosen because they are reasonably close to cave resources, and because they are large enough to provide some amenities. Major advantages and disadvantages of each area include:

Carlsbad Caverns Region

The City of Carlsbad, New Mexico, was selected to potentially house the Institute.

The advantages of the Carlsbad location have been listed in previous sections, and center primarily around its close proximity to Carlsbad Caverns; relatively large size; low cost of living; and affordable housing and land.

Disadvantages center mostly around the relative remoteness of Carlsbad's location. Although commuter air service is available from Carlsbad to Albuquerque, the nearest major airport is over 2 hours away. Cultural opportunities are somewhat limited; although Carlsbad provides some activities, its remoteness puts access to other larger communities that might be expected to provide activities at a great distance. Another disadvantage is Carlsbad's lack of leasable properties.

Black Hills Region

For this region, Rapid City, South Dakota, was selected to potentially house the Institute. Although the city is some 50 miles away from the cave resources located at Wind Cave National Park and Jewel Cave National Monument, closer communities were considered too small.

Rapid City possesses many advantages: It has a major airport in town; an interstate highway runs through it; there are two 4-year schools in town, one of which is the South Dakota School of Mines and Technology; high-quality health care is available; the unemployment rate is low; cultural and recreational activities are plentiful; and leasable property is available.

Mammoth Cave Region

The nearest suitable community to the resources at Mammoth Cave National Park is Bowling Green, Kentucky.

This location has many advantages: It is close to cave resources, some of which are in town; its nearest airport is 60 minutes away, in Nashville, Tennessee; an interstate highway runs through town; Western Kentucky University is in town – and it offers the only speleological curriculum in the Nation; leasable commercial properties are available; health care is readily

Historic trail route, Mammoth Cave National Park, Kentucky. Photo by Art and Peg Palmer.

Delicate selenite needles, Buffalo National River, Arkansas.
Photo courtesy of Spelean Research Associates.

accessible; and cultural and recreational activities abound in Bowling Green, and in neighboring communities such as Nashville and Louisville, Kentucky.

The major disadvantage to Bowling Green is its higher cost of living; and houses, commercial properties, and land are high compared with communities such as Carlsbad, New Mexico, and Harrison, Arkansas.

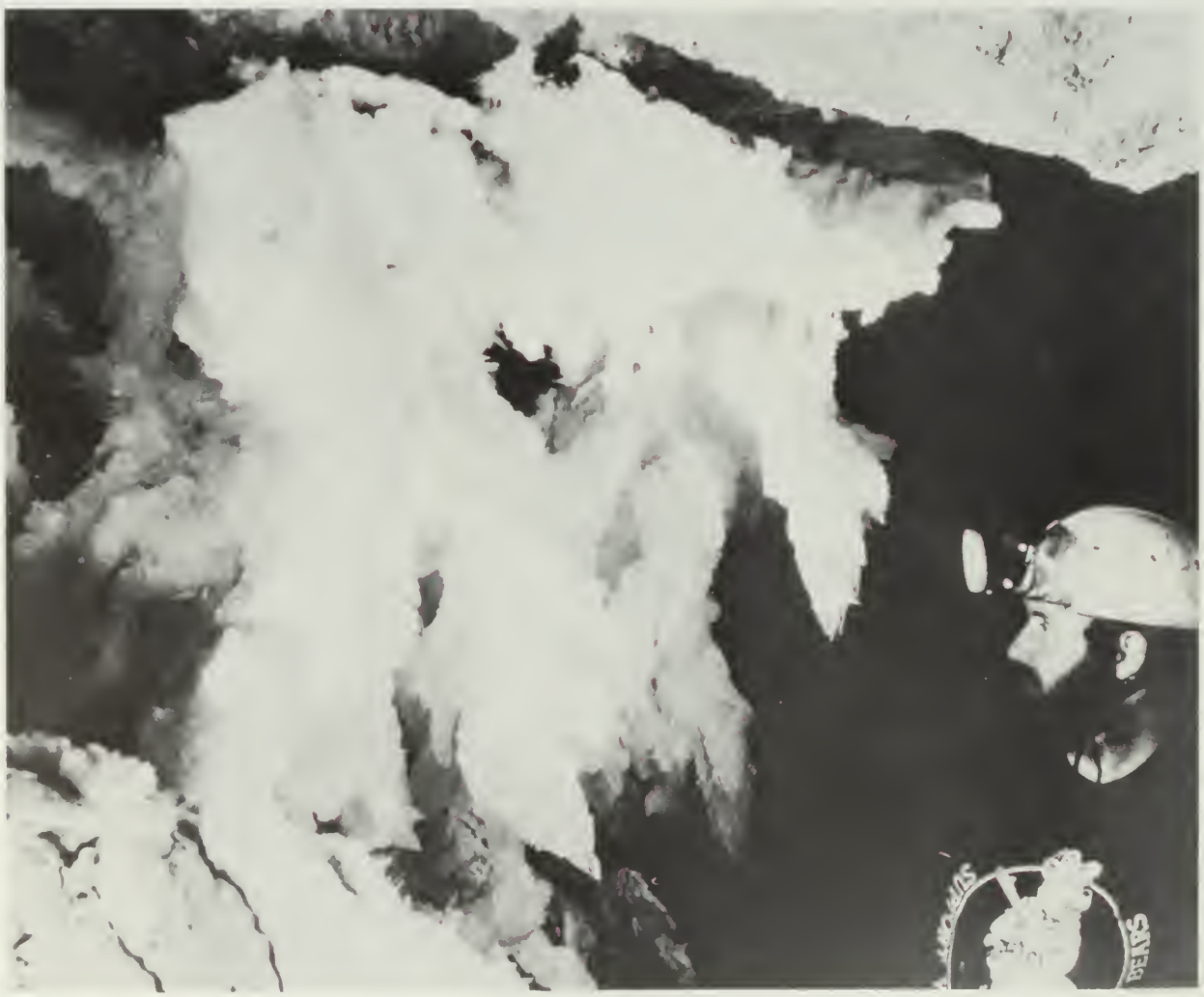
Ozark Mountain Region

This region within Buffalo National River and/or Ozark National Scenic Riverways, Harrison, Arkansas, was chosen to potentially house the Institute. Harrison is near the park, and although it is fairly small, it is located within a rural region, where most communities are much smaller.

Harrison possesses advantages chiefly in quality-of-life attributes. It has a low cost of living; low unemployment rate; and plentiful recreational and cultural opportunities, due to its proximity to university towns. Also, Branson, Missouri, offers numerous musical productions, and is a 30-minute drive from Harrison. Given its rural location, Harrison is reasonably accessible, with the nearest major airport in Springfield, Missouri, 75 miles away. There are two interstate highways within 75 miles of town. Four-year schools are located 75 miles away, in Springfield, Missouri; and in Fayetteville and Russellville, Arkansas.

Grand Canyon Region

For this region, Flagstaff, Arizona, was chosen to potentially house the Institute. The choice of a community for this region was difficult because of the region's sparseness of population. The nearest community,



Large gypsum crystals, Lechuguilla Cave, Carlsbad Caverns National Park, New Mexico.
Photo by Norm Thompson , Courtesy of the National Park Service.

Temple of the Sun, Carlsbad Caverns National Park, New Mexico.
Photo courtesy of the National Park Service.

Tusayan, is too small to be considered. The suitability of communities more distant from the park is no better until Flagstaff is reached some 80 miles away.

Flagstaff possesses the following advantages: It is the home of Northern Arizona University; unemployment is low; cultural and recreational opportunities are plentiful; and leasable commercial properties can be found.

Flagstaff also has some disadvantages: Relative to the other potential Institute sites, it is remote from cave resources; the nearest major airport is in Phoenix, some 160 miles away; and its cost of living is high compared with Carlsbad and Harrison.

Summary

Of the five areas evaluated in this study, all were found to meet most location criteria for the National Cave and Karst Research Institute; each could be a suitable site. Of these, the Carlsbad location was chosen because of the documented political support for implementation of an institute; strong local community support; and the numerous and diverse cave and karst resources found throughout the region.

Please note that wherever the Institute is located, an appropriate level of National Environmental Protection Act (NEPA) compliance would be undertaken. This NEPA process would be initiated when the Institute became funded.

Appendixes

Appendixes

A. Map of American Cave and Karst Resources
National Park Service Cave and Karst Resources

B. National Park Service Cave and Karst Areas

C. Worldwide Cave and Karst Societies /
Institutes / Programs

D. Cave and Karst Resources of Study Areas

E. Carlsbad Field Trip Summary

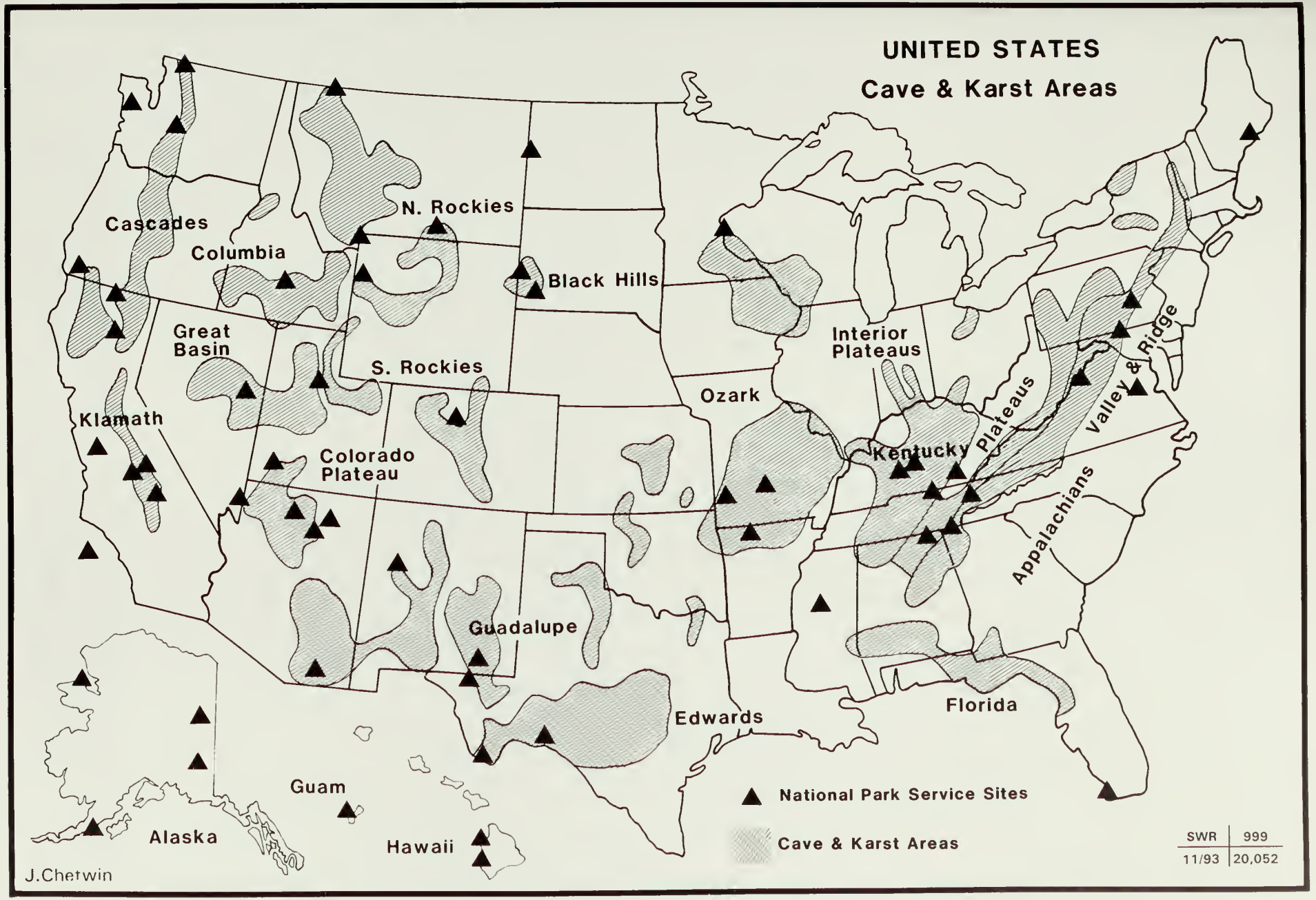
F. Legislation

1. Federal Cave Resources Protection Act, 1988
2. Public Law 101-578, November 15, 1990

G. Agenda of National Cave and Karst Research
Institute Study Workshop

H. Study Participants

A. Map of American Cave and Karst Resources
National Park Service Cave and Karst Resources


UNITED STATES
Cave & Karst Areas
Cascades
Columbia
N. Rockies
Black Hills
Great Basin
S. Rockies
Interior Plateaus
Ozark
Klamath
Colorado Plateau
Kentucky Plateaus
Valley & Ridge
Appalachians
Guadalupe
Edwards
Florida
Guam
Alaska
Hawaii
National Park Service Sites
Cave & Karst Areas
J.Chetwin
SWR 999
11/93 20,052

B. National Park Service Cave and Karst Areas

Abraham Lincoln Birthplace National Historic Site
2995 Lincoln Farm Road
Hodgenville, Kentucky 42748

Acadia National Park
P.O. Box 177,
Bar Harbor, Maine 04609

Amistad National Recreation Area
P.O. Box 420367
Del Rio, Texas 78842

Aniakchak National Monument and Preserve
P.O. Box 7
King Salmon, Alaska 99613

Big Bend National Park
P.O. Box 129
Big Bend, Texas 79834

Big South Fork National River and Recreation Area
Route 3, Box 401
Oneida, Tennessee 37841

Bighorn Canyon National Recreation Area
Box 458
Fort Smith, Montana 59035

Bering Land Bridge National Preserve
P.O. Box 220
Nome, Alaska 99762

Buffalo National River
Box 1173
Harrison, Arkansas 72601

Carlsbad Caverns National Park
3225 National Parks Highway
Carlsbad, New Mexico 88220

Cedar Breaks National Monument
82 North 100 East Street
Cedar City, Utah 84720

Channel Islands National Park
1901 Spinnaker Drive
Ventura, California 93001

Chesapeake and Ohio Canal National Historical Park
P.O. Box 4
Sharpsburg, Maryland 21782

Chickamauga and Chattanooga National Military Park
P.O. Box 2128
Ft. Oglethorpe, Georgia 30742

Colonial National Historical Park
P.O. Box 210
Yorktown, Virginia 23690

Coronado National Memorial
4101 East Montezuma Canyon Road
Hereford, Arizona 85615

Craters of the Moon National Monument
P.O. Box 29
Arco, Idaho 83213

Cumberland Gap National Historical Park
P.O. Box 1848
Middlesboro, Kentucky 40965-1848

Death Valley National Monument
P.O. Box 579
Death Valley, California 92328

El Malpais National Monument
P.O. Box 939
Grants, New Mexico 87020

Everglades National Park
P.O. Box 279
Homestead, Florida 33030

Glacier National Park
West Glacier, Montana 59936

Grand Canyon National Park
Box 129
Grand Canyon, Arizona 86023

Grand Teton National Park
P.O. Drawer 170
Moose, Wyoming 83012

Great Basin National Park
Baker, Nevada 89311

Great Smoky Mountains National Park
Gatlinburg, Tennessee 37738

Guadalupe Mountains National Park
HC 60, Box 400
Salt Flat, Texas 79847

Hawaii Volcanoes National Park
Hawaii National Park, Hawaii 96718

Jewel Cave National Monument
RR 1, Box 60AA
Custer, South Dakota 57730

Kaloko-Honokohau National
Historical Park
73-4786 Kanalani Street 14
Kailua Kona, Hawaii 96740

Kings Canyon National Park
Three Rivers, California 93271

Lake Mead National Recreation Area
601 Nevada Highway

Boulder City, Nevada 89005-2426
Lassen Volcanic National Park
Mineral, California 96063

Lava Beds National Monument
P.O. Box 867
Tulelake, California 96134

Mammoth Cave National Park
Mammoth Cave, Kentucky 42259

Mount Rainier National Park
Tahoma Woods, Star Route
Ashford, Washington 98304

Natchez Trace Parkway
RR 1, NT-143
Tupelo, Mississippi 38801

North Cascades National Park
2105 Highway 20
Sedro Woolley, Washington 98284

Olympic National Park
600 East Park Avenue
Port Angeles, Washington 98362

Oregon Caves National Monument
19000 Caves Highway
Cave Junction, Oregon 97523

Ozark National Scenic Riverways
P.0. Box 490
Van Buren, Missouri 63965

Pinnacles National Monument
Paicines, California 95043

Pu'uhonua o Honaunau
National Historical Park
P.O. Box 128
Honaunau, Hawaii 96726

Rocky Mountain National Park
Estes Park, Colorado 80517

Russell Cave National Monument
Route 1, Box 175
Bridgeport, Alabama 35740

Saint Croix National
Scenic Riverway
P.O. Box 708
Saint Croix Falls, Wisconsin 54024

Sequoia National Park
Three Rivers, California 93271

Shenandoah National Park
Route 4, Box 292
Luray, Virginia 22835

Sunset Crater Volcano National Monument
Route 3, Box 149
Flagstaff, Arizona 86004

Theodore Roosevelt National Park
P.O. Box 7
Medora, North Dakota 58645

Timpanogas Cave National Monument
Rural Route 3, Box 200,
American Fork, Utah 84003

Valley Forge National
Historical Park
P.O. Box 953
Valley Forge, Pennsylvania 19481
War in the Pacific National
Historical Park
P.O. Box FA
Agana, Guam 96910

Wilson's Creek National Battlefield
Route 2, Box 75
Republic, Missouri 65738

Wind Cave National Park,
R. R. 1, Box 190
Hot Springs, South Dakota 57747

Wrangell-St. Elias National
Park and Preserve
P.O. Box 29
Glennallen, Alaska 99588

Wupatki National Monument
H.C. 33, Box 444A
Flagstaff, Arizona 86004

Yellowstone National Park
P.O. Box 168
Yellowstone National Park, Wyoming
82190

Yukon-Charley Rivers
National Preserve
P.O. Box 167
Eagle, Alaska 99738

C. Worldwide Cave and Karst Societies / Institutes / Programs

United States

American Cave Conservation Association

- private non-profit organization dedicated to the preservation of cave and karst resources
- funded from membership dues and outside contributions
- publishes the *American Caves* magazine
- maintains a cave and karst museum
- provides public education programs
- provides series of cave management programs for Federal and state agencies

Cave Research Foundation

- non-profit organization with stated purpose to support and promote research, interpretation, and conservation activities in caves and karst areas
- supports work in the United States, and in other countries
- funded from private donations and from maps and books published under their publications branch, Cave Books
- sponsors fellowship and grant program
- provides scientific support personnel

- has field facilities at Mammoth Cave National Park, and is active in Buffalo National River, Kings Canyon, Carlsbad Caverns National Park, Lava Beds National Monument, and Ozark National Scenic Riverway

- publishes quarterly newsletter and annual report

Karst Waters Institute

- private, non-profit organization dedicated to educating the public, professionals, and private sector professionals toward helping to prevent and solve environmental and landuse problems in karst regions

- fosters state-of-the-art, collaborative, interdisciplinary, basin-wide, and long-term karst research projects; develops new research techniques and methods; offers research programs for resident and visiting scientists; and increases karst research funding

- offers cooperative graduate education with degree-granting institutions

- publishes quarterly newsletter, and research in leading karst journals and other related disciplines

- sponsors national and international conferences and symposiums

- developing a National Karst Library and Data Bank

National Speleological Society (NSS)

- non-profit organization with purpose to promote interest in, and to advance in any and all ways, the study and science of speleology; and promote the protection of caves and their natural contents; and promote fellowship among interested people

- supported by membership dues and private contributions

- local chapters nation wide called "Grottos"

- sections such as Cave Photography Section, Cave Conservation and Management Section

- provides leadership for the steering committee to guide the National Cave Management Symposiums

- publishes the monthly *NSS News,* the semi-annual *NSS Bulletin,* and a caving information series

- provides grants for speleological research, including a fellowship program

Ozark Underground Laboratory

- privately operated group available to conduct speleological contract work

- located on property with an active river cave with a large and diverse cave faunal population

- conducts educational field trips

- has its field facilities on cave property

Western Kentucky University

- graduate and undergraduate studies available, which emphasize cave and karst studies

- conducts a "Summer University at Mammoth Cave" program, with courses in speleology, karst hydrology and geology, and cave exploration, with an additional course in the karst geo-archeology of Yucatan, Mexico

There are other universities and institutes around the world that emphasize or offer courses oriented to the study of caves and karst, but none are oriented to the extent of the Institute in China, located in Guilin. It is government funded; provides graduate and undergraduate studies exclusively dedicated to cave and karst research; and is located in one of the greatest cave and karst areas in the world.

In Italy, the Instituto Italiano di Speleologia is attached to a university, and is primarily the efforts of one person. The Cave Institute in France is a university-sponsored field station engaged in studies at a single cave. McMaster University in Ontario, Canada, offers a heavy curriculum in cave and karst studies. The Karst Institute in the former Yugoslavia is located at the famous Postojna commercial cave. The primary institutes and universities engaged in karst field studies around the world are as follows:

Canada

Department of Geography
McMaster University
Hamilton, Ontario L8S 4K1

China

Institute of Karst Geology
40 Qixing Road
Guilin, Guangxi 541004

Former Czechoslovakia

Department of Hydrogeology and
Engineering Geology
Faculty of Science
Charles University
128 43, Praha 2, Albertov 6

Ceskoslovenska Academie ved
Geograficky
ustav
662 82 Brno
Mendlovo nam 1

England

School of Geography
Oxford University
Mansfield Road
Oxford OX1, 3TB

Geologist
Trent Polytechnic
Nottingham NG1 4BU

France

Laboratoire Souterrain du CNRS
09200 Moulis, St. Girons

Laboratoire D'Hydrogeologie
Universite des Sciences et Techniques de
Languedoc
Place E. Bataillon
34060 Montpellier

Italy

C/O Istituto Italiano di Speleologia
Universite de Bologna
Via Zamboni 67

New Zealand

Geography Department
University of Auckland
Auckland

Norway

Universitetet 1 Bergen
Geologisk Institutt
AVD. B
Allegt, 41, N-5007
Bergen

Poland

The Institute of Geological Sciences
Craccow
Oleandry Str. 2a
Jagellonian University

Romania

Institutul de Geologie si Geofizica
Str. Caransebes nr.1
Sector 1 - Cod 74388
Bucuresti

Switzerland

Centre D'Hydrogeologie
De L'universite de Neuchatel
Rue Emile-Argand 11
CH-2000 Neuchatel 7

Turkey

International Research and Application
Center for Karst Water Resources
Hacettepe University
Beytepe 06532
Ankara

United States

Water Resources Center
Desert Research Institute
University of Nevada System
Suite 201
1500 East Tropicana Avenue
Las Vegas, Nevada 89109

Former USSR

The Karst Commission
The Institute of Geological Sciences
Academy of Sciences of the Ukrainian SSR
Kiev

Former Yugoslavia

Institut Za Raziskovanje Krasa
SAZU, Titov trg 2
66230, Postojna

D. Cave and Karst Resources of Study Areas

About 15 percent of the United States (excepting Alaska) is covered with water-soluble rock; that is, limestone, dolomite, or gypsum. As a result, there are over 20 major karst areas in the United States. We will focus on five of the areas with major karst and cave features: the Mammoth Cave area; the area surrounding the Black Hills (Wind and Jewel Caves); the Ozark Plateau (Buffalo National River and Ozark Scenic Riverways); the Guadalupe Mountains (Carlsbad Caverns); and the Colorado Plateau (the Grand Canyon).

Mammoth Cave

Mammoth Cave is the longest Cave in the world, with over 340 miles of surveyed passage. It is contained in a region of the United States encompassing some of the most famous cave areas in the world. The caves in the famous Central Kentucky Karst (Mammoth Cave) are among the longest in the world, with many miles of passages surveyed annually. They are massive cave complexes of great karst activity, both current and fossil.

The Mammoth Cave karst constitutes a highly complex ecosystem of interrelated surface and subsurface terrestrial and aquatic communities, which faces a myriad of environmental threats. For these reasons, the park and the lands encompassing its external primary groundwater basins were declared an International Biosphere Reserve. Both historic and prehistoric ethnographic and archeological resources of world-class significance, including intact artifacts and structures, are extant within the park caves. Approximately 300 known caves and cave entrances have been located within the park, among hundreds of others in the region.

Common cave characteristics of this entire region are dendritic networks composed of one or more large trunk passages fed by tributaries, representing the evolution of mature drainage systems during development. Surface basins drained through the caves are large in area and multiple levels in most long caves reflect progressive down-cutting of surface streams. The systematic exploration of these great cave systems is very active, and many major discoveries can be anticipated.

The Ozark Plateau

This plateau covers the southern two-thirds of Missouri, and reaches into Arkansas, Illinois, and Oklahoma. The Ozark Highlands is a natural physiographic region composed of approximately 50,000 square miles (roughly the size of the State of Florida). This region is superb aquifer country, which has been soaking up, transporting, and storing groundwater for millions of years, thereby forming the present complexity of characteristic karst features.

Ozark Scenic Riverways contains approximately 280 caves, as well as other significant karst features, such as one of largest karst springs in the United States. Buffalo National River has over 220 caves and other karst features, including the two largest cave systems in the State of Arkansas. The caves are generally dendritic in character, and are developed as horizontal systems with active streams.

The Black Hills

The Black Hills of South Dakota have a central core of igneous rock surrounded by a skirt of limestone. All of the area caves are contained within this encircling band of sedimentary rock. Most of the known caves are short except for Jewel and Wind Caves, which are, respectively, the fourth and seventh longest caves in the world. The caves are multi-level, joint-controlled systems, which result in complex three-dimensional mazes. They are the epitome of maze caves in the world. The caves are developed in a confined aquifer and exhibit features consistent with dissolution by artesian thermal waters, and were influenced by paleo-karst features. Both of these world-class caves contain a wide variety of speleothem types, and have contributed much to the understanding of caves in areas of paleo-karst.

The Colorado Plateau

This plateau is dissected by the Grand Canyon. Massive beds of limestone are exposed in the canyon's walls, which contain hundreds of mostly horizontal caves. The caves are short, but contain large passages and range from dry fossil systems to active river systems, with waterfalls pouring from their canyon-walled resurgence openings. The caves of the Grand Canyon are difficult to access, but offer challenging rewards in their hydrological systems and mineralogy, and their very important cultural resources. Work in the caves has been slow, due to their difficult access and the sensitivity of their cultural materials.

The Guadalupe Mountains

This area is best known for Carlsbad Cavern and Lechuguilla Cave – two of the most spectacular caves ever discovered. The caves of the area are relatively short, but contain very large passages, which end abruptly. The caves are primarily developed in limestone and dolomite by waters rich in hydrogen sulfide gas. This interesting type of speleogenesis is being studied most intensely in the Guadalupe Mountains area. One of the caves (Lechuguilla) is the seventh longest cave in the world, and the deepest cave in the United States. The nearby Delaware basin is floored with gypsum and contains classic gypsum karst features, and one of the gypsum caves is the second longest gypsum cave in the Nation.

E. Carlsbad Field Trip Summary

Because of the references in Legislation, and to the workshop's preliminary recommendation, a field visit was made to Carlsbad. The purpose of the visit was to determine the range of building sites that might be available to house the National Cave and Karst Research Institute. Of primary interest were sites that could conceivably be donated for this purpose. Also of interest were lease opportunities.

Participating in this visit were appropriate study team members and local officials connected with the Chamber of Commerce and Department of Development.

The local community was very supportive regarding the possibility of the Institute being located in Carlsbad. Toward this end, the team was shown several potential building sites that might be donated. The community also expressed confidence that, if needed, they could help obtain part of the funding needed to get the project implemented.

Site attributes considered attractive to the team included:

- Ideally, the site should be in the same vicinity as other similarly-focused facilities, such as research entities and educational institutions.
- It would be less attractive to locate the Institute in commercial or industrial areas.
- The site should be no more than 30-60 minutes from major cave resources.
- The site should be no more than 30-60 minutes from the local community.

All sites visited had infrastructure in place, were located within 30-60 miles of the community and of cave resources, and had buildable land (relatively flat). Most were available as donations. Most presented little, if any, perceived environmental constraints to development.

After touring several potential sites, the group concluded that the most favorable sites were found at the northern end of town. These sites met all positive attributes listed in the paragraphs above. Most important were adjacent land uses. Present were three similarly focused entities, which emphasize research and education: the Carlsbad branch of New Mexico State University, the Living Desert Zoological and Botanical State Park, and the future Carlsbad Environmental Monitoring and Research Center. Most of the sites were also visually attractive and possessed fine views of the surrounding area.

Most of the other locations visited were discarded as possibilities, primarily because all had incompatible adjacent land uses. Two other locations were rejected because they were located on National Park Service land, and one of the criteria for location was that the site could not be within park boundaries.

It should be noted that the opportunity to lease an appropriate structure might be very limited. At the time of the site visit, local officials stated that they were aware of very few such structures – either that were presently available, or that might be available in the future. The lack of commercial structures may be due to the small size of the community and to its relatively slow growth rate; that is, no pronounced periods of developmental boom and bust.

F. LEGISLATION

1. Federal Cave Resources Protection Act, 1988

Public Law 100-691
100th Congress

An Act

Nov. 18, 1988
[H.R. 1975]

To protect cave resources on Federal lands, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

Federal Cave Resources Protection Act of 1988.
Minerals and mining.
Conservation.
16 USC 4301 note.

SECTION 1. SHORT TITLE.

This Act may be referred to as the "Federal Cave Resources Protection Act of 1988".

16 USC 4301.

SEC. 2. FINDINGS, PURPOSES, AND POLICY.

(a) FINDINGS.—The Congress finds and declares that—

(1) significant caves on Federal lands are an invaluable and irreplaceable part of the Nation's natural heritage; and

(2) in some instances, these significant caves are threatened due to improper use, increased recreational demand, urban spread, and a lack of specific statutory protection.

(b) PURPOSES.—The purposes of this Act are—

(1) to secure, protect, and preserve significant caves on Federal lands for the perpetual use, enjoyment, and benefit of all people; and

(2) to foster increased cooperation and exchange of information between governmental authorities and those who utilize caves located on Federal lands for scientific, education, or recreational purposes.

(c) POLICY.—It is the policy of the United States that Federal lands be managed in a manner which protects and maintains, to the extent practical, significant caves.

16 USC 4302.

SEC. 3. DEFINITIONS.

For purposes of this Act:

(1) CAVE.—The term "cave" means any naturally occurring void, cavity, recess, or system of interconnected passages which occurs beneath the surface of the earth or within a cliff or ledge (including any cave resource therein, but not including any vug, mine, tunnel, aqueduct, or other manmade excavation) and which is large enough to permit an individual to enter, whether or not the entrance is naturally formed or manmade. Such term shall include any natural pit, sinkhole, or other feature which is an extension of the entrance.

(2) FEDERAL LANDS.—The term "Federal lands" means lands the fee title to which is owned by the United States and administered by the Secretary of Agriculture or the Secretary of the Interior.

(3) INDIAN LANDS.—The term "Indian lands" means lands of Indian tribes or Indian individuals which are either held in trust by the United States for the benefit of an Indian tribe or subject to a restriction against alienation imposed by the United States.

(4) INDIAN TRIBE.—The term "Indian tribe" means any Indian tribe, band, nation, or other organized group or community of Indians, including any Alaska Native village or regional or village corporation as defined in, or established pursuant to, the Alaska Native Claims settlement Act (43 U.S.C. 1601 et seq.).

(5) CAVE RESOURCE.—The term "cave resource" includes any material or substance occurring naturally in caves on Federal lands, such as animal life, plant life, paleontological deposits, sediments, minerals, speleogens, and speleothems.

(6) SECRETARY.—The term "Secretary" means the Secretary of Agriculture or the Secretary of the Interior, as appropriate.

(7) SPELEOTHEM.—The term "speleothem" means any natural mineral formation or deposit occurring in a cave or lava tube, including but not limited to any stalactite, stalagmite, helictite, cave flower, flowstone, concretion, drapery, rimstone, or formation of clay or mud.

(8) SPELEOGEN.—The term "speleogen" means relief features on the walls, ceiling, and floor of any cave or lava tube which are part of the surrounding bedrock, including but not limited to anastomoses, scallops, meander niches, petromorphs and rock pendants in solution caves and similar features unique to volcanic caves.

SEC. 4. MANAGEMENT ACTIONS. 16 USC 4303.

(a) REGULATIONS.—Not later than nine months after the date of the enactment of this Act, the Secretary shall issue such regulations as he deems necessary to achieve the purposes of this Act. Regulations shall include, but not be limited to, criteria for the identification of significant caves. The Secretaries shall cooperate and consult with one another in preparation of the regulations. To the extent practical, regulations promulgated by the respective Secretaries should be similar.

(b) IN GENERAL.—The Secretary shall take such actions as may be necessary to further the purposes of this Act. Those actions shall include (but need not be limited to)—

(1) identification of significant caves on Federal lands:

(A) The Secretary shall prepare an initial list of significant caves for lands under his jurisdiction not later than one year after the publication of final regulations using the significance criteria defined in such regulations. Such a list shall be developed after consultation with appropriate private sector interests, including cavers. Records.

(B) The initial list of significant caves shall be updated periodically, after consultation with appropriate private sector interests, including cavers. The Secretary shall prescribe by policy or regulation the requirements and process by which the initial list will be updated, including management measures to assure that caves under consideration for the list are protected during the period of consideration. Each cave recommended to the Secretary by interested groups for possible inclusion on the list of significant caves shall be considered by the Secretary according to the requirements prescribed pursuant to this paragraph, and shall be added to the list if the Secretary determines that the cave meets the criteria for significance as defined by the regulations. Regulations.

(2) regulation or restriction of use of significant caves, as appropriate;

Contracts.

(3) entering into volunteer management agreements with persons of the scientific and recreational caving community; and

(4) appointment of appropriate advisory committees.

(c) PLANNING AND PUBLIC PARTICIPATION.—The Secretary shall—

(1) ensure that significant caves are considered in the preparation or implementation of any land management plan if the preparation or revision of the plan began after the enactment of this Act; and

(2) foster communication, cooperation, and exchange of information between land managers, those who utilize caves, and the public.

16 USC 4304.

SEC. 5. COFIDENTIALITY OF INFORMATION CONCERNING NATURE AND LOCATION OF SIGNIFICANT CAVES.

(a) IN GENERAL.—Information concerning the specific location of any significant cave may not be made available to the public under section 552 of title 5, United States Code, unless the Secretary determines that disclosure of such information would further the purposes of this Act and would not create a substantial risk of harm, theft, or destruction of such cave.

State and local governments. Schools and colleges.

(b) EXCEPTIONS.—Notwithstanding subsection (a), the Secretary may make available information regarding significant caves upon the written request by Federal and State governmental agencies or bona fide educational and research institutions. Any such written request shall, at a minimum—

(1) describe the specific site or area for which information is sought;

(2) explain the purpose for which such information is sought; and

(3) include assurances satisfactory to the Secretary that adequate measures are being taken to protect the confidentiality of such information and to ensure the protection of the significant cave from destruction by vandalism and unauthorized use.

16 USC 4305.

SEC. 6. COLLECTION AND REMOVAL FROM FEDERAL CAVES.

(a) PERMIT.—The Secretary is authorized to issue permits for the collection and removal of cave resources under such terms and conditions as the Secretary may impose, including the posting of bonds to insure compliance with the provisions of any permit:

(1) Any permit issued pursuant to this section shall include information concerning the time, scope, location, and specific purpose of the proposed collection, removal or associated activity, and the manner in which such collection, removal, or associated activity is to be performed must be provided.

(2) The Secretary may issue a permit pursuant to this subsection only if he determines that the proposed collection or removal activities are consistent with the purposes of this Act, and with other applicable provisions of law.

(b) REVOCATION OF PERMIT.—Any permit issued under this section shall be revoked by the Secretary upon a determination by the Secretary that the permittee has violated any provision of this Act, or has failed to comply with any other condition upon which the permit was issued. Any such permit shall be revoked by the Secretary upon assessment of a civil penalty against the permittee

pursuant to section 8 or upon the permittee's conviction under section 7 of this Act. The Secretary may refuse to issue a permit under this section to any person who has violated any provision of this Act or who has failed to comply with any condition of a prior permit.

(c) TRANSFERABILITY OF PERMITS.—Permits issued under this Act are not transferable.

(d) CAVE RESOURCES LOCATED ON INDIAN LANDS.—(1)(A) Upon application by an Indian tribe, the Secretary is authorized to delegate to the tribe all authority of the Secretary under this section with respect to issuing and enforcing permits for the collection or removal of any cave resource, or to carrying out activities associated with such collection or removal, from any cave resource located on the affected Indian lands.

(B) In the case of any permit issued by the Secretary for the collection or removal of any cave resource, or to carry out activities associated with such collection or removal, from any cave resource located on Indian lands (other than permits issued pursuant to subparagraph (A)), the permit may be issued only after obtaining the consent of the Indian or Indian tribe owning or having jurisdiction over such lands. The permit shall include such reasonable terms and conditions as may be requested by such Indian or Indian tribe.

(2) If the Secretary determines that issuance of a permit pursuant to this section may result in harm to, or destruction of, any religious or cultural site, the Secretary, prior to issuing such permit, shall notify any Indian tribe which may consider the site as having significant religious or cultural importance. Such notice shall not be deemed a disclosure to the public for purposes of section 5. Religion.

(3) A permit shall not be required under this section for the collection or removal of any cave resource located on Indian lands or activities associated with such collection, by the Indian or Indian tribe owning or having jurisdiction over such lands.

(e) EFFECT OF PERMIT.—No action specifically authorized by a permit under this section shall be treated as a violation of section 7.

SEC. 7. PROHIBITED ACTS AND CRIMINAL PENALTIES. 16 USC 4306.

(a) PROHIBITED ACTS.—

(1) Any person who, without prior authorization from the Secretary knowingly destroys, disturbs, defaces, mars, alters, removes or harms any significant cave or alters the free movement of any animal or plant life into or out of any significant cave located on Federal lands, or enters a significant cave with the intention of committing any act described in this paragraph shall be punished in accordance with subsection (b). Animals. Plants.

(2) Any person who possesses, consumes, sells, barters or exchanges, or offers for sale, barter or exchange, any cave resource from a significant cave with knowledge or reason to know that such resource was removed from a significant cave located on Federal lands shall be punished in accordance with subsection (b).

(3) Any person who counsels, procures, solicits, or employs any other person to violate any provisions of this subsection shall be punished in accordance with section (b).

(4) Nothing in this section shall be deemed applicable to any person who was in lawful possession of a cave resource from a significant cave prior to the date of enactment of this Act.

(b) PUNISHMENT.—The punishment for violating any provision of subsection (a) shall be imprisonment of not more than one year or a fine in accordance with the applicable provisions of title 18 of the United States Code, or both. In the case of a second or subsequent violation, the punishment shall be imprisonment of not more than 3 years or a fine in accordance with the applicable provisions of title 18 of the United States Code, or both.

16 USC 4307.

SEC. 8. CIVIL PENALTIES.

(a) ASSESSMENT.—(1) The Secretary may issue an order assessing a civil penalty against any person who violates any prohibition contained in this Act, any regulation promulgated pursuant to this act, or any permit issued under this Act. Before issuing such an order, the Secretary shall provide such person written notice and the opportunity to request a hearing on the record within 30 days. Each violation shall be a separate offense, even if such violations occurred at the same time.

(2) The amount of such civil penalty shall be determined by the Secretary taking into account appropriate factors, including (A) the seriousness of the violation; (B) the economic benefit (if any) resulting from the violation; (C) any history of such violations; and (D) such other matters as the Secretary deems appropriate. The maximum fine permissible under this section is $10,000.

District of Columbia.

(b) JUDICIAL REVIEW.—Any person aggrieved by an assessment of a civil penalty under this section may file a petition for judicial review of such assessment with the United States District Court for the District of Columbia or for the district in which the violation occurred. Such a petition shall be filed within the 30-day period beginning on the date the order assessing the civil penalty was issued.

(c) COLLECTION.—If any person fails to pay an assessment of a civil penalty—

(1) within 30 days after the order was issued under subsection (a), or

(2) if the order is appealed within such 30-day period, within 10 days after court has entered a final judgment in favor of the Secretary under subsection (b),

the Secretary shall notify the Attorney General and the Attorney General shall bring a civil action in an appropriate United States district court to recover the amount of penalty assessed (plus costs, attorney's fees, and interest at currently prevailing rates from the date the order was issued or the date of such final judgment, as the case may be). In such an action, the validity, amount, and appropriateness of such penalty shall not be subject to review.

(d) SUBPOENAS.—The Secretary may issue subpoenas in connection with proceedings under this subsection compelling the attendance and testimony of witnesses and subpoenas duces tecum, and may request the Attorney General to bring an action to enforce any subpoena under this section. The district courts shall have jurisdiction to enforce such subpoenas and impose sanctions.

Courts, U.S.

16 USC 4308.

SEC. 9. MISCELLANEOUS PROVISIONS.

(a) AUTHORIZATION.—There are authorized to be appropriated $100,000 to carry out the purposes of this Act.

(b) EFFECT ON LAND MANAGEMENT PLANS.—Nothing in this Act shall require the amendment or revision of any land management

plan the preparation of which began prior to the enactment of this Act.

(c) FUND.—Any money collected by the United States as permit fees for collection and removal of cave resources; received by the United States as a result of the forfeiture of a bond or other security by a permittee who does not comply with the requirements of such permit issued under section 7; or collected by the United States by way of civil penalties or criminal fines for violations of this Act shall be placed in a special fund in the Treasury. Such moneys shall be available for obligation or expenditure (to the extent provided for in advance in appropriation Acts) as determined by the Secretary for the improved management, benefit, repair, or restoration of significant caves located on Federal lands.

(d) Nothing in this Act shall be deemed to affect the full operation of the mining and mineral leasing laws of the United States, or otherwise affect valid existing rights.

SEC. 10. SAVINGS PROVISIONS. 16 USC 4309.

(a) WATER.—Nothing in this Act shall be construed as authorizing the appropriation of water by any Federal, State, or local agency, Indian tribe, or any other entity or individual. Nor shall any provision of this Act—

(1) affect the rights or jurisdiction of the United States, the States, Indian tribes, or other entities over waters of any river or stream or over any ground water resource;

(2) alter, amend, repeal, interpret, modify, or be in conflict with any interstate compact made by the States; or

(3) alter or establish the respective rights of States, the United States, Indian tribes, or any person with respect to any water or water-related right.

(b) FISH AND WILDLIFE.—Nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the States with respect to fish and wildlife.

Approved November 18, 1988.

LEGISLATIVE HISTORY—H.R. 1975:

HOUSE REPORTS: No. 100-534 (Comm. on Interior and Insular Affairs).
SENATE REPORTS: No. 100-559 (Comm. on Energy and Natural Resources).
CONGRESSIONAL RECORD, Vol. 134 (1988):
Mar. 28, considered and passed House.
Oct. 21, considered and passed Senate, amended. House concurred in Senate amendment.

2. Public Law 101-578, November 15, 1990

Public Law 101-578
101st Congress

An Act

Nov. 15, 1990
[H.R. 5796]

To conduct certain studies in the State of New Mexico.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

Natural resources.
Public lands.

TITLE II—CAVE RESEARCH INSTITUTE

SEC. 201. FINDINGS.

16 USC 4310 note.

The Congress makes the following findings:

(1) The World's most exposed fossil reef, Capitan Reef, in southern New Mexico that includes Carlsbad Caverns, contains over 300 caves, including 75 identified caves in Carlsbad Caverns National Park and 22 caves in Guadalupe Mountains National Park.

(2) Recent explorations of Lechuguilla Cave at Carlsbad Caverns National Park have provided much new information about the wonders of this cave including the fact that it is the second deepest cave in the United States and contains outstanding world-class cave features such as gypsum crystal chandeliers and gypsum flowers.

(3) The Lechuguilla Cave has been described by cave researchers as possibly the finest cave in America.

(4) The interest and excitement of cave researchers throughout the world have been focused on Carlsbad Caverns National Park.

(5) Cave researchers could use this research institute as an operational base for study of caves in other regions and as a focal point for storage of data on cave geology and speleology.

(6) The Congress, with the passage of Public Law 100-691, the Federal Cave Resources Protection Act of 1988, recognized the significance of cave resources on Federal lands and established the policy that Federal lands be managed in a manner which protects and maintains, to the extent practicable, significant cave resources.

SEC. 202. ESTABLISHMENT OF CAVE RESEARCH PROGRAM.

16 USC 4310.

(a) ESTABLISHMENT.—In order to provide for needed research relating to cave resources on certain lands in the United States, the Secretary of the Interior, acting through the Director of the National Park Service shall establish and administer a Cave Research Program (hereinafter in this title referred to as the "Program"). The Program shall include the orderly and scholarly collection, analysis, and dissemination of research material related to caves in lands managed by the National Park Service including, but not limited to, Carlsbad Caverns National Park and the Capitan Reef area.

(b) FUNCTIONS.—The Program shall produce educational and interpretive information and materials vital to public understanding of cave geology, assist students and researchers, and provide for a comprehensive evaluation of cave resources and measures needed for their protection.

(c) EMPHASIS.—The program shall be directed primarily toward lands managed by the National Park Service, but the Secretary of the Interior may enter into cooperative agreements with other agencies or entities as may be appropriate to carry out the purposes of this title.

16 USC 4310 note.

SEC. 203. CAVE RESEARCH INSTITUTE STUDY.

Not later than one year after enactment of this Act, the Secretary of the Interior shall prepare and transmit to the Committee on Energy and Natural Resources of the United States Senate and the Committee on Interior and Insular Affairs of the United States House of Representatives a study on the feasibility of establishing a Cave Research Institute. The Study shall include the need for such a facility, its costs, its purposes, what the facility should include and where it should be located. An analysis of potential sites for the Institute should include, but not be limited to, Carlsbad Caverns National Park.

16 USC 4310 note.

SEC. 204. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated such sums as may be necessary to carry out the provisions of this title.

G. Agenda of National Cave and Karst Research Institute Study Workshop

National Cave and Karst Research Institute Study Workshop
August 17 - August 20, 1992

Agenda

August 17, 1992

Travel to Albuquerque, New Mexico; take the hotel shuttle (free) to Holiday Inn Midtown; register/receive information packages.

August 18, 1992

8:00-8:30 a.m.	Introduction: Overview of study goals and objectives; overview of workshop goals, objectives, and format. Presented by Doug Faris, National Park Service.
8:30-10:00 a.m.	Presentations on potential aspects of National Cave and Karst Research Institute (NCRI): 1. Queen, "Aspects of Scientific Documentation"; 2. Fletcher, "NCRI Program and Institute, Opportunities"; 3. Mylroie, "Cooperation With Other Institutions."
10:00-10:30 a.m.	Break.
10:30-11:30 a.m.	Continuation of presentations: 4. McLean, "Other Research Institutes"; 5. DuChene, "Potential Benefits of a NCRI to Private Industry."
11:30-12:00 p.m.	Break into four work groups: each group receive topic/focus, 1-page handout of instructions with examples. Topic/focus: 1. Need/focus/goals/role of NCRI; 2. Programs; 3. Locational needs, preliminary assessment of four areas; 4. Management/operations.

12:00-1:00 p.m.	Lunch buffet in hotel restaurant.
1:00-3:00 p.m.	Work groups discuss/develop recommendations pertaining to topic/ focus.
3:00-3:30 p.m.	Break.
3:30-5:30 p.m.	Each group to present findings/recommendations to overall group; overall group to critique recommendations.
7:30 p.m.	Dinner at Maria Theresa's.

August 19, 1992

8:00-10:00 a.m.	Presentations illustrating attributes of potential NCRI location: 1. Ed Greene, Carlsbad Caverns; 2. Jim Nepsted, Wind Cave; 3. John Apel, Buffalo River; 4. Jeff Bradybaugh, Mammoth Cave.
10:00-10:30 a.m.	Break.
10:30-12:00 p.m.	Panel discussion on applicable research being done, benefits/lack of benefits that a NCRI would provide to that research: 1. Dianna Northrup, Cave Research Foundation; 2. Stephen Lambert, Ph.D., Sandia Labs; 3. Carol Hill, University of New Mexico.
12:00-1:00 p.m.	Lunch buffet in hotel restaurant.
1:00-1:30 p.m.	Summarize findings of previous day: recommendations of work groups; points of disagreement identified; points of agreement identified; major issues.
1:30-3:00 p.m.	Group discussion on each of the four major topic areas, focusing briefly on points of agreement and largely on points of disagreement, and on anything identified as a major issue.
3:00-3:30 p.m.	Break.
3:30-5:00 p.m.	Continue group discussion.

Dinner on your own.

8:00 p.m.	Slide presentation on Lechuguilla Cave, presented by Dale Pate, Carlsbad Caverns.

August 20, 1992

8:00-10:00 a.m.	Summarize NCRI attributes developed previous day, resolve remaining issues/areas of disagreement.
10:00-10:30 a.m.	Break.
10:30-11:00 a.m.	Wrap-up: next steps to be taken in study process; role expectations of participants (to complete study); assignments; schedule.
1:00-5:00 p.m.	Optional field trip to El Malpais National Monument.

H. Study Participants

National Park Service Study Team

Douglas Faris, Project Coordinator; Associate Regional Director, Planning and Professional Services, Southwest Region

Peggy Krauser, Team Leader; Landscape Architect, Office of the Associate Regional Director, Planning and Professional Services, Southwest Region

Ron Kerbo, Cave Management Specialist, Division of Natural Resources Management, Southwest Region

Joan Mitchell, Senior Project Coordinator, Office of the Associate Regional Director, Planning and Professional Services, Southwest Region

Jane Harvey, Writer/Editor, Office of the Associate Regional Director, Planning and Professional Services, Southwest Region

Judy Chetwin, Visual Information Specialist, Division of Interpretation and Visitor Services, Southwest Region

Milford R. Fletcher, Ph.D., Unit Leader, National Park Service Cooperative Park Studies Unit, University of New Mexico

Frank Deckert, Superintendent, Carlsbad Caverns National Park, Southwest Region

Ed Greene, Chief of Interpretation, Carlsbad Caverns National Park, Southwest Region

Dale Pate, Cave Management Specialist, Carlsbad Caverns National Park, Southwest Region

John Apel, Resource Management Specialist, Buffalo National River, Southwest Region

Jeff Bradybaugh, Chief, Division of Natural Resources Management and Science, Mammoth Cave National Park, Southeast Region

Jim Nepstad, Cave Management Specialist, Wind Cave National Park, Rocky Mountain Region

Kate Cannon, Superintendent, Jewell Cave National Monument, Rocky Mountain Region

Kim Crumbo, Resources Management Specialist, Grand Canyon National Park, Western Region

Consultants

James R. Goodbar, Outdoor Recreation Planner, Bureau of Land Management

Jerry L. Trout, Cave Management Specialist, U. S. Forest Service

John McLean, Hydrologist, Water Resources Division, U. S. Geographical Survey

Harvey R. Duchene, Petroleum Geologist, AXEM Resources, Denver, Colorado

J. Michael Queen, Ph.D., Carbonate Sedimentologist

Arthur Palmer, Ph.D., Professor of Hydrology, Department of Earth Science, State University of New York

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As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally-owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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